

WHAT IS CLAIMED IS :

I claim :

1. A design and control method of a micro-nanometer precision servo pneumatic X-Y positioning table comprising :

5 a design of the precision servo pneumatic X-Y positioning table;
a compensation method of the velocity compensation signal used on the positioning control of the pneumatic cylinder, and a process of the positioning control method.

10 2. A design and control method of a nanometer-level accuracy precision servo pneumatic X-Y positioning table in accordance with claim 1, wherein the said design of the precision servo pneumatic X-Y positioning table comprising:

two slide air cylinders drive the table;

15 a positioning sensor optical scale is used to send back the position signal, and then the system has the resolution of the micro-nanometer level; an ordinary Linear Variable Differential Transformer and resistance scales don't have the resolution of the micro-nanometer level, and a servo valve or a proportional valve.

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3. A design and control method of a micro-nanometer precision servo pneumatic X-Y positioning table in accordance with claim 1, wherein the said compensation strategy of the velocity compensation signal comprising:

the decision of the waveform and the frequency of the velocity compensation signal, the frequency of the velocity compensation signal being larger than the system's natural frequency, and the waveform being the absolute value of sinusoidal wave signal and is able to be replaced by the square wave signal;

the decision of the amount of offset (A) of the velocity compensation signal depended on the characteristic curve of the servo valve; the value "a" of the positive dead zone of the servo valve being the positive offset of the velocity compensation signal, and the value "-b" of the negative dead zone of the servo valve being the negative offset of the velocity compensation signal;

the decision of the amplitude (B) of the velocity compensation signal depended on the characteristic curve of the velocity and the friction force of the pneumatic cylinder with low velocity; the slope of the curve of the friction force of the pneumatic cylinder with low velocity making the amplitude in inverse proportion to the velocity;

the decision of the largest amplitude of the velocity compensation signal depended on the largest friction force of the pneumatic cylinder; subtracting the value of the dead zone of the servo valve from the value of the smallest voltage of the pneumatic cylinder's slide and get the value of the

largest amplitude, and
the velocity compensation signal being able to be used with
servo valve control, besides, with proportion
electromagnetic valve control or with high speed solenoid
5 valve pulse-width-modulated signal control signal.

4. A design and control method of a micro-nanometer precision
servo pneumatic X-Y positioning table in accordance with claim
1, wherein said process of the positioning control method
10 comprising:

the judgment of the velocity being smaller than the critical
velocity (V_c) or not, and decided to compensate or not, and
the judgment of the error being larger or smaller than zero,
and decided to compensate the positive compensation or the
15 negative compensation.